INSTALLATION INSTRUCTIONS

X-08™/CEX-08™

Type 1F

HIGH SECURITY ELECTRONIC LOCK

MAS-HAMILTON
MEMBER OF THE UNICAN GROUP

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INTRODUCTION

Please read all instructions before you install and use your Model X-08/CEX-08 lock. This will help you avoid unnecessary costs and concerns resulting from improper installation.

BASIC TOOLS AND MATERIALS NEEDED

1. Small Phillips head screwdriver (#0)
2. Medium Phillips head screwdriver (#1/#2)
3. Standard hacksaw (32 teeth/inch)
4. Six inch metal scale or ruler

Recommended, but not required:

5. Small flat file
6. Small vise
7. Torque screwdriver (30 inch-pound capacity), or
8. Standard torque wrench with screwdriver bits

Note: *See table of recommended torques for the various X-08 lock screws.*

All other necessary tools and materials are provided.

TABLE OF RECOMMENDED TORQUES FOR THE VARIOUS X-08 LOCK SCREWS			
Applications	**P/N**	**Screw Size**	**Torque (In.Lb.)**
Lock Case Cover	105030	6-32	9.0 to 11.0
Dial Ring Mounting	105034	8-32	17.0 to 20.0
Dial Ring Cover	105034	8-32	17.0 to 20.0
Lock Case Mounting	105046/105195	1/4-20	25.0 to 30.0
Dial Hub Setscrew	105290	8-32	17.0 to 20.0

LOCK PARTS FOR INSTALLATION

1. Lock Assembly
2. Dial Ring Assembly
3. Dial
4. Spindle
5. Dial Hub Assembly

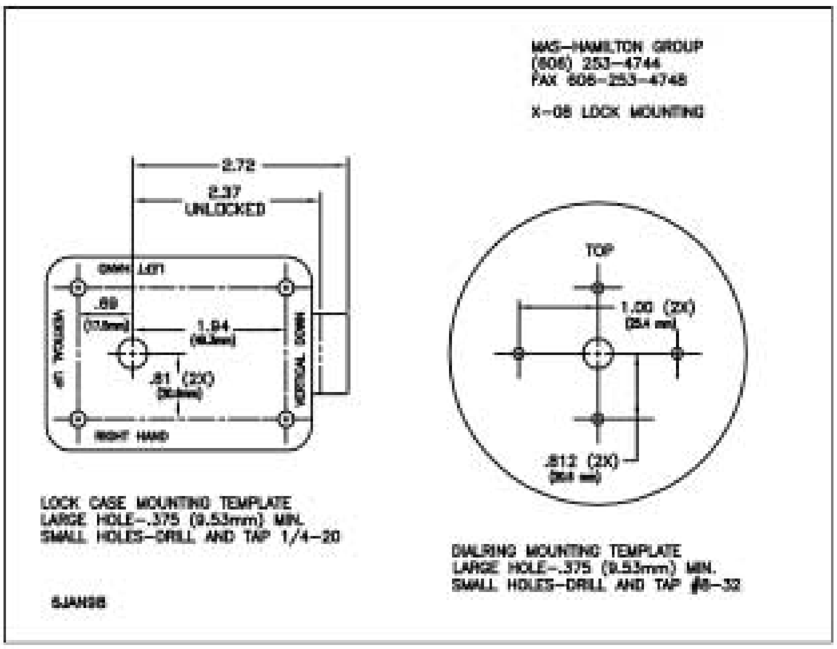
INSTALLATION KIT CONTENTS

1. Rubber Vise Clamp
2. Saw Blade (52 teeth/inch)
3. Saw Handle
4. Tube Deburr Stone
5. Outer Tube
6. Inner Tube
7. Dial Ring Mounting Screws (2)
8. Lock case Mounting Screws (4)
9. Cover Lock Pin Retainer
10. Cover Lock Spring
11. Cover Lock Pin
12. Stick-on Cable Guides (3)
13. Generator Zebra Holder
14. Lubricant
15. Dial Hub Locating Gage
16. Hex Key (5/64”)



TEMPLATE

A template is provided as an aid for locating, drilling, and tapping the lock case and dial ring mounting screw holes relative to the spindle hole. Since the lock is designed to fit most industry standard container lock mounting screw hole patterns, the need to use this template should be minimal.



PREPARATION FOR NEW INSTALLATION OF THE LOCK

1. Use the template to establish the exact relative locations of all of the necessary mounting holes for the lock case and the dial ring, when necessary.
2. The lock case mounting screws require drilled and tapped 1/4-20 screw holes.
3. The dial ring mounting screws require drilled and tapped #8-32 screw holes.
4. The spindle hole must be 3/8 inch diameter, minimum.

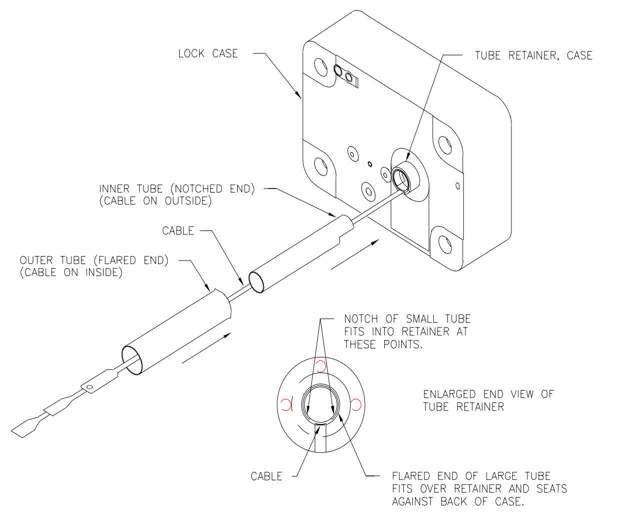


FIGURE 1
TUBE–CABLE ASSEMBLY RELATIONSHIPS

Figure 1- Tube-Cable Assembly Relationships

INSTALLATION

PRELIMINARY LOCK INSTALLATION

1. Remove the two screws from the lock assembly cover and remove the back cover.

WARNING: *The electronics in the X-08/CEX-08 are susceptible to damage from Electro Static Discharge (ESD). Make sure you are properly grounded before removing the lock cover and be careful to avoid touching the connectors on the card.*

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2. Remove the drive cam assembly from the lock case assembly.
3. Feed the cables through the outer, larger, tube starting from the flared end of the tube. Seat the tube into position on the tube retainer on the back of the lock case assembly. (See Figure 1 on previous page) Be careful to keep the cables pulled taut while seating the tube to avoid pinching damage to them.
4. Carefully guide the outer tube (keeping it in place on the tube retainer) through the container wall so that the outer tube and the cables are easily accessible at the outside wall of the container. On some containers, the only way to do this is to retract the bolt. If this is the case, remember to extend the bolt and slide to their fullest extension after installing the lock case mounting screws and before continuing.

Note: *Another outer tube inserted from the dial ring side, with the cables carefully fed through it, would be very helpful as a guide for greater ease in feeding the cables through the container wall.*

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5. Attach the lock case assembly to the container wall using the lock case mounting screws.
6. Holding the outer tube against its seat on the tube retainer move the lock case assembly around until the tube is reasonably centered in the hole in the outside container wall.
7. Tighten the lock case mounting screws to hold the lock case in place.



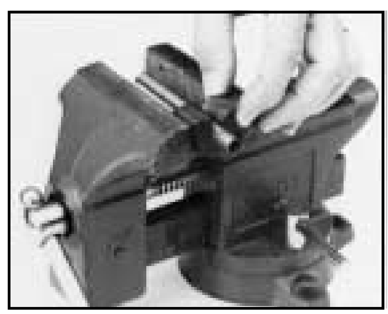
CUTTING THE TUBES

Warning: *The end of the large tube that is to be discarded must be from the plain (unflared) end of the tube. The end of the small tube that is to be discarded must also be from the plain (unnotched) end of the tube.*

1. Make sure that the outer tube is properly placed over the lock case tube retainer.
2. While holding the outer tube firmly in its seated position, use a 6 inch scale or ruler to measure 5/16 inch from the container wall and mark the outer tube at this length.
3. Remove the lock case assembly from the container and remove the outer tube for cutting.
4. Assemble the saw blade and wooden saw handle provided. When the saw frame neck is fully seated into the handle, grip the saw frame (preferably in a vise) and tap the handle another 1/8" to 1/4" onto the saw frame neck. This will reduce the tendency of the handle to turn on the saw frame when sawing.



Note: *This saw is intended only for cutting the tubes. A standard hacksaw should be used to cut the spindle.*



5. Insert the tube to be cut into the rubber vise clamp (provided). Then firmly clamp the rubber vise clamp in a vise. Use the saw to cut the tube where marked. Be careful to keep the cut as straight as possible. Remember the saw only cuts when pushing. Trying to cut while pulling may pull the handle off of the saw blade. Repeat for the second tube.

6. Install the inner tube on the lock case. Feed the cables through the outer tube and install the outer tube on the lock case. Measure and mark the inner tube to be 1/16 to 1/8 inch longer than the outer tube. (See Figure 2.) Remove the inner tube and cut by the same method as described in Step 5.

Figure 2 - Inner and Outer Tubes

Warning: *The end of the large tube that is to be discarded must be from the plain (unflared) end of the tube. The end of the small tube that is to be discarded must also be from the plain (unnotched) end of the tube.*



7. The inside and outside of the tubes must be deburred after cutting. Use the stone which is provided for this purpose. Make sure there are no sharp edges on either tube inside and outside so as not to damage the cables.

INSTALLATION OF THE LOCK

1. Place the inner, smaller, tube into the lock case tube retainer. Make sure that the cutout in the tube aligns with the cables and allows the tube to seat completely in the tube retainer.

2. Feed the cables through the outer (larger) tube from the flared end. Seat the tube into position on the tube retainer on the back of the lock case assembly. (See Figure 1 on page 4) Be careful to keep the cables pulled taut while seating the tube to avoid pinching damage to them.
3. Carefully guide the outer tube (keeping it in place on the tube retainer) through the container wall so that the outer tube and the cables are easily accessible at the outside wall of the container, retracting the bolt if necessary.
4. Loosely attach the lock case assembly to the container wall using the lock case mounting screws.
5. Holding the outer tube against its seat on the tube retainer, move the lock case assembly around until the tube is reasonably centered in the hole in the outside container wall.
6. Tighten the lock case mounting screws to the specified torque.

INSTALLATION OF THE DIAL RING

1. Remove the two screws from the dial ring assembly cover and remove the cover.

Note: *Make sure the tubes are projecting through the container as shown in Figure 2. If not, the tubes are not seated properly in the lock or they were not cut to the proper length. Correct the problem before proceeding.*

2. Feed the cables through the tube retainer on the dial ring assembly and place the dial ring assembly over the end of the tubes. Make sure the tubes are seated in the tube retainer on the dial ring assembly.

Note: *It may be necessary to rotate the tube retainer in the dial ring so that the cables come through the notch in the tube retainer. See Appendix A for details.*

3. Attach the dial ring to the container with the dial ring mounting screws and tighten to the specified torque.

INSTALLATION OF THE CABLES





1. Open the ZIF (Zero Insertion Force) seal cover and move the ZIF connector locking actuators outward to their open position.
2. Plug the cables into the ZIF connectors with the bright metal tabs on the cables facing toward the circuit board to which the ZIF connectors are mounted. Push the cables into the connectors as far as they will go.
3. Close the ZIF locking actuators to lock the cables in place.
4. Close the ZIF seal. Be sure the tenons are in the holes.

Figure 3 - LCD and ZIF connectors

INSTALLATION OF GENERATOR CABLE AND CABLE GUIDES

1. Place the generator cable into the dial ring housing recess containing a post used for positioning the cable. (See diagrams in Appendix B.) The hole in the cable must be positioned over the post on the dial ring, and the five gold tabs must be exposed.
2. The Zebra strip and strip holder are assembled at the factory but may come apart during shipment. If so, insert the Zebra strip into the Zebra strip holder.

CAUTION: The Zebra strip is an electrical connector. Keep it clean!

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3. Place the generator Zebra strip and strip holder assembly over the generator cable, and press it into the recess. The hole in the Zebra strip holder must be positioned over the post in the dial ring. Be sure that the black Zebra strip holder is positioned as shown in Figure 4.
4. Install at least one of the stick-on cable guides in an appropriate position to restrain the cables.
5. Route the cables through the cable guide that was just installed.
6. Depending on the thickness of the container, additional cable guides may be necessary to ensure the cables are sufficiently restrained. Some possible locations are shown in Figure 5. Install additional guides as needed, and route the LCD and generator cables through them to ensure that the cables do not get routed through the "KEEP CLEAR" area.

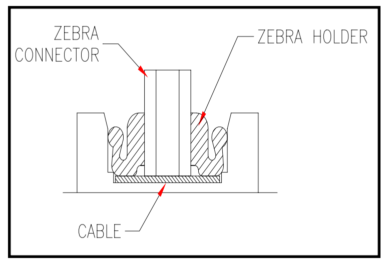


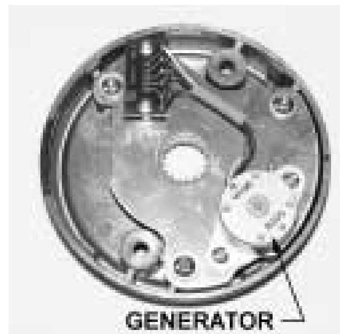
Figure 4 - Generator Zebra Strip

Figure 5 - Cable Guide Locators

Note: *See Appendix B for more detail on routing the cables.*

INSTALLATION OF THE DIAL RING COVER

1. Align the dial ring cover with the dial ring so the generator is at the five o’clock position and the four aligning lugs align with the corresponding slots in the dial ring.
2. Carefully slide the dial ring cover into the dial ring.
3. Hold the dial ring cover in place and tighten the two dial ring cover mounting screws to the specified torque.



CUTTING AND INSTALLING THE SPINDLE

1. Ensure that the lock bolt is extended and remove the cam from the lock case.
2. Check the stepper motor gear positioning.

Note: *To avoid unnecessary damage, always make sure that the motor gear is in its proper detent position (see below) when inserting the drive cam. If it is not, a pencil may be used to move it to the proper position. This must be done with the lock bolt extended.*

Wrong Position

Proper Position

3. Slide the spindle through the cam and reinsert cam into the lock case and the dial ring cover until the spindle nut is snug against the cam and the cam is seated against the lock case. Note that the square portion of the spindle must be aligned with the square hole in the lock case.
4. Slide the dial hub onto the spindle, turning the hub slightly to align the generator drive gear teeth. Hold the cam and spindle in place while installing the dial hub.
5. Snug down one setscrew to hold the dial hub in place.
6. Carefully cut the spindle so that it is flush to 1/32 inch past the surface of the hub.
7. Remove all burrs from the end of the spindle.

INSTALLATION OF THE DIAL HUB AND DIAL

1. Loosen the setscrew and remove the hub.
2. Apply lubricant to the hub bearing surface.

3. While holding the drive cam and spindle in their proper positions in the lock case assembly inside the container, push the dial hub assembly onto the spindle.

4. Place the Dial Hub Locating Gage over the spindle and between the dial hub assembly and the bushing in the dial ring cover. This sets up an initial 0.010 inch end play.

Recommendation: *Make a bend in the dial hub locating gage at its midpoint. This will keep it from acting as a spring as the hub is positioned for locking to the spindle.*

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5. Push the dial hub and the spindle assembly toward each other. While maintaining a constant pressure on them, SECURELY tighten the setscrews in the dial hub assembly to 17-20 inch-pounds of torque (a minimum of 1 inch deflection of the handle of the hexkey). Tighten the inner setscrew first. Remove the dial hub locating gage.

Caution: *Tighten in a downward motion in case the hexkey should break.*

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6. Apply lubricant to the retaining ring on the dial hub assembly and position the retaining ring so that an equal amount of it is consistently exposed around the hub. Also, apply grease from the lubricant tube to the entire ramp area just inside the back of the dial.

Note: *Assure that the retaining ring gap is aligned with the setscrews and that an equal amount of the retaining ring is exposed around the hub so the dial can slide easily into place on the hub without interference from the retaining ring.*

7. Carefully place the dial over the dial hub assembly, holding the dial square to the spindle and apply pressure to the dial until the retaining ring seats in the dial.

Note: *You should not be able to pull the dial away from the dial hub assembly.*

INSTALLING THE BACK COVER AND BAFFLE

1. Install the baffle over the spindle nut in the center of the cam.

Note: *Be very careful not to touch the connectors on the card to avoid damage from ESD.*

2. Install the back cover assembly with the two mounting screws. Do not install the cover lock pin. Take care to align the connectors and the baffle.
3. Verify the operation of the lock as described on the following page under **INSTALLATION COMPLETION CHECKLIST.**

INSTALLING THE COVER LOCK ASSEMBLY

WARNING: ***Failure to verify that the lock is operational before installing the cover lock pin assembly may cause a lock out condition.***

1. Dial the combination and retract the lock bolt. Leave the bolt in the fully retracted position and remove the back cover assembly.
2. Insert the cover lock pin through the back cover.
3. Install the cover lock spring and retainer clip onto the cover lock pin. The “fingers” of the retainer clip should be angled away from the cover lock spring.

Note: *A small hammer and the cut off piece from the outer tube can be used to install the spring and clip. Do not push the retainer past the small groove in the cover lock pin.*

4. Record the lock serial number in a secure location.
5. Make sure the bolt is fully retracted and reinstall the back cover with the cover lock pin in place. Take care to align the following: the two connectors, the baffle to the hole in the cover, and the cover lock pin to the keyhole slot in the bolt rack.
6. Tighten the mounting screws to the specified torque.
7. After restoring the bolt to the extended position, verify that the cover lock pin is fully recessed into the back cover. If not, gently wiggle the cover lock pin to seat it.

INSTALLATION COMPLETION CHECKLIST

1. Does the dial turn freely without scraping or binding?
2. Have all screws been securely tightened?
3. If the lock just installed is a CEX-08 lock, you may need to reset a Covert Entry (CE) condition. Dial left to “power” the lock. If CE is displayed, see **RESET COVERT ENTRY CONDITION** on the following page.
4. Operate the lock using the preset factory combination of 50-25-50. See **OPENING the X-08/CEX-08** on the following page.

RESET COVERT ENTRY (CE) CONDITION FOR CEX-08

When the **CEX-08** lock is powered up (dial left) after installation, it may display Covert Entry (**CE**). This condition must be reset with the following procedure ,using the factory Reset Combination, before you can test opening the lock.

CW=ClockWise; CCW=CounterClockWise

1. Dial **continuously** to the **left** (CCW) until the number of successful openings is displayed.
2. Dial **right** (CW) to **99**. **E1** will appear.
3. Dial **right** to the first number of the **Reset Combination** (Factory Reset Combination = **50-25-50**). **E2** will appear.
4. Dial **right** to second combination number. **E3** will appear.
5. Dial **right** to third combination number.
   The Covert Entry condition should now be reset.

The lock may now be opened with the preset factory combination of 50-25-50.

OPENING THE X-08/CEX-08 (FACTORY COMBINATION)

CW=ClockWise; CCW=CounterClockWise

1. Dial **left** (CCW) until lock is "powered". Stop. **E1** will be displayed.
2. Dial **right** until the first number of the factory combination, **50**, appears on the LCD.

   NOTE: *When dialing to the right after the **E1**, **E2**, or **E3** prompts, the first numbers to appear on the LCD will alternately be 00 or 50. **DO NOT stop on these numbers the first time they appear if they are part of your three number combination. Continue to dial to the right until the number appears for the second time.***

   Stop on 50 and wait until **E2** appears, approximately two seconds.
3. After **E2** with a right arrow appears, continue to dial **right** until you reach the second number of the factory combination, **25**. Stop on 25 and wait until **E3** appears, approximately two seconds.
4. After **E3** with a right arrow appears, continue to dial **right** until you reach the third number in the factory combination, **50**.

   NOTE: *When dialing to the right after the **E1, E2**, or **E3** prompts, the first numbers to appear on the LCD will alternately be 00 or 50. **DO NOT stop on these numbers the first time they appear if they are part of your three number combination. Continue to dial to the right until the number appears for the second time.***

   Stop and wait until **OP** appears, approximately two seconds.
5. After **OP** with a right arrow (**OP**en right) is displayed, dial to the right to retract the lock bolt.

APPENDIX A
TUBE RETAINER POSITIONS

The tube retainer must be positioned so the cables come through the notch in the retainer.

APPENDIX B
CABLE ROUTING DIAGRAMS

Use the following diagrams to route the cables. Choose the diagram that most closely represents the thickness of the container door you are working with.The following table and diagram illustrate the recommended positon for different door thicknesses.

Door Thickness	Cable Exit Position	Bolt Position
4.5	3	Left
2.5	1	Right
3/4	2	Down

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